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Highlights of GAO-04-639, a report to congressional requesters

## GENDER ISSUES

# Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX

### Why GAO Did This Study

Title IX of the Education Amendments of 1972 extended protections against sex discrimination to students and employees at institutions receiving federal assistance for educational programs or activities. In the 32 years since Title IX was enacted, women have made significant gains in many fields, but much attention has focused on women's participation in the sciences.

Because of the concern about women's access to opportunities in the sciences, which receive billions of dollars in federal assistance, this report addresses: (1) how do the Department of Education (Education), the Department of Energy (Energy), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF) ensure that federal grant recipient institutions comply with Title IX in math, engineering, and science; (2) what do data show about women's participation in these fields; and (3) what promising practices exist to promote their participation?

### What GAO Recommends

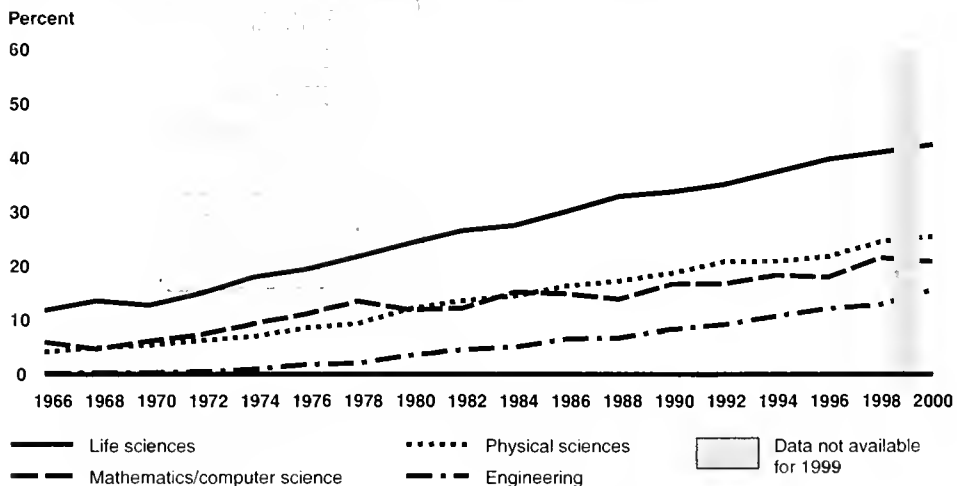
In this report, we make recommendations to the Administrator of NASA, the Secretary of Energy, and the Director of NSF that they take actions to ensure that compliance reviews of grantees are conducted as required by Title IX.

### What GAO Found

Four federal science agencies have made efforts to ensure that grantees comply with Title IX in the sciences by performing several compliance activities, such as investigating complaints and providing technical assistance, but most have not conducted all required monitoring activities. Agency officials at Energy, NASA, and NSF told us that they refer complaints to Education and the Equal Employment Opportunity Commission, where they are investigated. However, only Education has monitored its grantees by conducting compliance reviews—periodic, agency-initiated assessments of grantees to determine if they are complying with Title IX.

Women's participation in the sciences has increased substantially in the last three decades, especially in the life sciences, such as biology. The proportion of women science students has grown, but to a lesser extent at the graduate level than the undergraduate level. Meanwhile, the proportion of faculty in the sciences who are women has also increased, but they still lag behind men faculty in terms of salary and rank. However, studies indicate that experience, work patterns, and education levels can largely explain these differences. Studies also suggest that discrimination may still affect women's choices and professional progress.

Percentage of Doctoral Degrees Earned by Women from 1966-2000

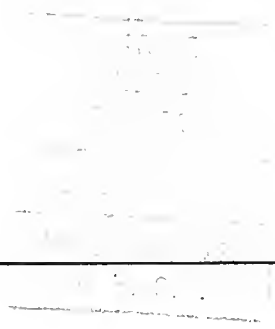


Source: NSF Survey of Earned Doctorates

We found several examples of agencies and grantees that have instituted practices designed to foster greater women's participation in the sciences. While some of the practices are aimed at encouraging more women to pursue the sciences, others provide time off and fewer teaching duties so faculty can balance work and family life. Finally, a few practices seek to expand the recruiting pool for jobs in the sciences and make them more attractive to a greater portion of the U.S. population, including women.



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## Abbreviations

BPS	Beginning Postsecondary Students Longitudinal Study
EEOC	Equal Employment Opportunity Commission
IPEDS	Integrated Postsecondary Education Data System
NASA	National Aeronautics and Space Administration
NCES	National Center for Education Statistics
NSF	National Science Foundation
NSOPF	National Survey of Postsecondary Faculty
OCR	Office for Civil Rights
SDR	Survey of Doctorate Recipients
SED	Survey of Earned Doctorates

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July 22, 2004

The Honorable Ron Wyden  
The Honorable Barbara Boxer  
United States Senate

Discrimination against women in areas such as college admissions, intercollegiate athletics, and employment was widespread 40 years ago. Although civil rights laws in the 1960s barred discrimination in employment, it was not until Title IX of the Education Amendments of 1972 that these protections were extended to students and faculty by prohibiting discrimination on the basis of sex in education programs and activities receiving any federal financial assistance. While researchers would agree that Title IX has contributed to greater inclusion of women and girls in sports programs, some have stated that there is little awareness that the law applies to academics.

In the 32 years since Title IX was enacted, women's roles in American life have changed greatly and women have made significant gains in many fields. Despite these gains, much attention has focused on the limited participation of women in mathematics, engineering, and science.<sup>1</sup> Because of increased interest about women's access to mathematics, engineering, and science, which receive billions of dollars in federal assistance, you asked us to determine what is being done to ensure compliance with Title IX in regard to the sciences. This report addresses: (1) how do the Department of Education (Education), the Department of Energy (Energy), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF) ensure that federal grant recipient institutions comply with Title IX in mathematics, engineering, and science; (2) what do data show about women's participation in these fields; and (3) what promising practices exist to promote their participation?

To answer these questions, we reviewed the legislation and regulations to identify all areas of compliance relevant to each federal agency. We

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<sup>1</sup>For purposes of this report we refer to all mathematics, engineering, and science programs as "the sciences" and to Education, Energy, NASA and NSF as "the federal science agencies."

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interviewed officials at each agency and gathered documentation to identify agency activities to ensure compliance with Title IX. We analyzed data from the Office for Civil Rights (OCR) at Education and the Equal Employment Opportunity Commission (EEOC)—the agencies where most sex discrimination complaints are filed. Given its role as coordinating agency of Title IX compliance, we also gathered data and interviewed officials at the Department of Justice (Justice). We visited seven research universities where we interviewed officials, students, and faculty.<sup>2</sup> We also visited six national laboratories and technology centers where we talked with administrators and scientists.<sup>3</sup> To gather information on women's participation and experiences in the sciences, we analyzed national data from Education and NSF. We also reviewed literature about women in the sciences and challenges they face preparing for and pursuing careers in the sciences. To identify promising practices to promote women's participation in the sciences, we spoke with students and practitioners. To assess the reliability of the various Education and NSF data sources, we reviewed documentation on how the data were collected and performed electronic tests to look for missing or out-of-range values. In addition, we reviewed the methodology of studies and reports using generally accepted social science principles as a basis for including their results in our report. On the basis of these reviews and tests, we found the data and studies sufficiently reliable for our purposes. We conducted our review from July 2003 through June 2004 in accordance with generally accepted government auditing standards. (See app. I for a more extensive explanation of this report's objectives, scope, and methodology.)

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## Results in Brief

Federal science agencies have made efforts to ensure that federal grant recipients comply with Title IX in the sciences by performing several compliance activities, such as investigating complaints and providing technical assistance, but most have not conducted all required monitoring activities. Specifically, according to Energy, NASA, and NSF officials, each agency referred complaints involving educational institutions to Education and those involving employment to EEOC for investigation. Officials at

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<sup>2</sup>We used the Carnegie Classification of colleges and universities to categorize institutions of higher education. For purposes of this report, institutions of higher education classified as doctoral/research universities are referred to as research universities.

<sup>3</sup>Energy has designated 24 laboratories and technology centers as their preeminent facilities where more than 30,000 scientists and engineers perform cutting-edge research. (See app. II for a full listing of Energy's national laboratories and technology centers.)

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Education and EEOC reported that they have investigated or resolved all complaints filed with them or referred to them from other agencies. However, agency officials told us that they could not determine whether grantees have investigated Title IX sex discrimination complaints they have received, since grantees are not required to report on their activities. Federal agencies have provided grantees technical assistance and outreach materials to encourage compliance with Title IX. The agencies also obtain required assurance statements from every grantee that they will not discriminate. While each of the four agencies has conducted complaint investigations and provided technical assistance, only Education has monitored its grantees by conducting periodic Title IX compliance reviews—agency-initiated assessments of grantees to determine if they are complying with the law.<sup>4</sup>

Women's participation in the sciences has increased substantially in the last three decades, especially in the life sciences, such as biology. While women constituted only 3 percent of all scientists in the early 1960s, they constituted nearly 20 percent by 2003. The proportion of women science students has grown, but to a lesser extent at the graduate level than at the undergraduate level. In 2000, 40 percent of undergraduates pursuing science studies were women, although they accounted for less than a third of the graduate students—despite women constituting a majority of college enrollment at both the undergraduate and the graduate levels. However, in that same year, in the life sciences, women constituted the majority of both undergraduate and graduate students, and earned more bachelors and masters degrees than men. Meanwhile, the proportion of faculty in the sciences who are women has also increased since the early 1970s. However, female faculty members still lag behind their male counterparts in terms of salary and rank, and much of their gain in numbers has been in the life sciences, as opposed to mathematics and engineering. A variety of studies indicate that experience, work patterns, and education levels can largely explain differences in salaries and rank. We found that women faculty in the sciences more often taught than their male counterparts and less often were given the opportunity to focus on their scientific research as their primary work activity. A few studies also suggest that discrimination may still affect women's choices and

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<sup>4</sup>The term "compliance review" as we use it in this report refers to reviews of grantees who have already received grant funding. These reviews are also known as postaward compliance reviews.

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professional progress, assertions that we also heard during many of our site visits to selected campuses.

Some grant-making agencies, universities, and laboratories have instituted policies and practices designed to foster greater female participation in the sciences. Some of these are aimed at encouraging more women to pursue and to persist in education in the sciences. Others provide time off and fewer teaching duties so junior faculty can balance work and family life while beginning a university career. In addition, some policies and practices seek to expand the recruiting pool for jobs in the sciences and make them more attractive to women.

In this report, we are making recommendations to the Administrator of NASA, the Secretary of Energy, and the Director of NSF that they take actions to ensure that compliance reviews of grantees are conducted as required by Title IX regulations.

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## Background

With certain exceptions, Title IX of the Education Amendments of 1972 requires all entities receiving any form of federal financial assistance to prohibit sex discrimination in their education programs or activities, which are defined broadly under Title IX to include all the operations of the entity. Because most postsecondary schools have students who receive federal financial assistance, such as federally supported student aid, Title IX applies to most 2-year and 4-year schools, both public and private. In addition to postsecondary schools, many other recipients of federal educational grants, such as K-12 school districts, private laboratories, and museums, are also subject to Title IX. Title IX's provisions apply to all operations and ancillary services of covered programs. For example, the law applies to recruitment, student admissions, scholarship awards, tuition assistance, other financial assistance, housing, access to courses and other academic offerings, counseling, employment assistance to students, health and insurance benefits and services, and athletics. It also applies to all aspects of employment, including recruitment, hiring, promotion, tenure, demotion, transfer, layoff, termination, compensation, benefits, job assignments and classifications, leave, and training.

Under Title IX, federal agencies that administer grants are required to conduct several compliance activities. For example, Title IX regulations

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require agencies to conduct periodic compliance reviews of their grant recipients.<sup>5</sup> A compliance review is an agency-initiated assessment of grantees to determine if they are complying with the law. Agencies must also make a prompt investigation in response to timely written complaints from individuals who allege that a grantee has engaged in sex discrimination, or whenever a compliance review or any other information indicates a possible failure to comply with Title IX. If the investigating agency does not find evidence that the grantee has failed to comply with Title IX, it must inform both the grant recipient and the complainant in writing. If the investigating agency does find evidence of noncompliance with Title IX, then the agency must first attempt to resolve the matter informally. For example, the agency could attempt to mediate the issue to encourage the grantee to voluntarily modify its activities in order to comply with the law. If the matter cannot be resolved informally, then the agency must take additional steps to secure compliance, including suspending or terminating federal financial assistance. Individuals or groups are allowed to file their complaints with grantees or with funding agencies such as Education or NSF. If complainants are not satisfied with the result of investigations, they can file their complaints with another entity. For example, if a complaint is filed at the grantee level and the complainant is unhappy with the result, he or she can file a complaint at the agency level. In addition to filing complaints, individuals or groups have the option of filing suit in federal court. (See app. III for information on selected legal cases and events involving Title IX since 1972.)

While federal agencies have primary responsibility for ensuring compliance with Title IX, recipients of federal grants also have some compliance responsibilities. For example, grantees are required to provide assurances that their education programs or activities are operated in compliance with Title IX. Grantees are also required to designate at least one employee to coordinate their compliance efforts and to establish complaint procedures to resolve student and employee Title IX

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<sup>5</sup>Education published Title IX regulations in 1975, while Energy published its original regulations in 1980. A final common rule was published in August 2000 on Title IX enforcement for several agencies, including NASA and NSF. Energy replaced its previous regulations with the provisions of the common rule in 2001. The Title IX regulations for all four agencies that we examined are substantially the same and for purposes of this report any reference to a regulatory requirement is applicable to all four agencies. All agencies' Title IX regulations also incorporate their respective procedural regulations, including complaint procedure requirements, for Title VI of the Civil Rights Act of 1964, which prohibits discrimination on the basis of race in any program or activity receiving federal funds.

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complaints. Finally, grantees must provide notification to students and employees that sex discrimination is prohibited in their programs or activities.

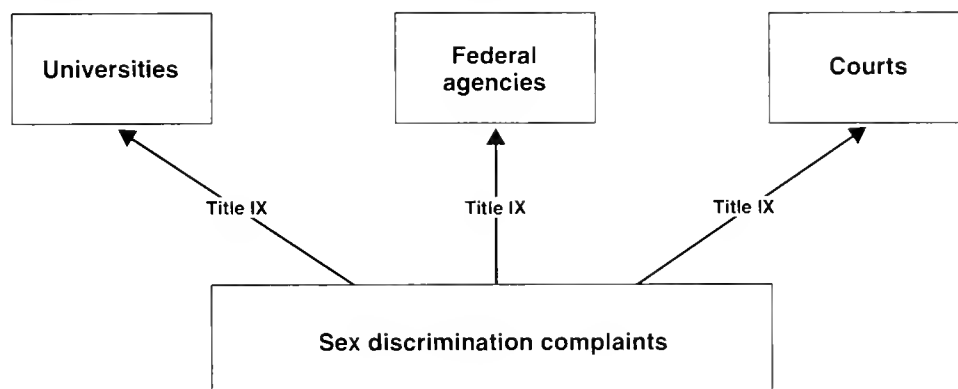
All federal agencies have enforcement responsibilities under Title IX. All federal agencies, including Education, Energy, NASA, and NSF, are responsible for handling Title IX enforcement of their own grantees and may refer complaints against educational institutions to Education's OCR and employment-related sex discrimination complaints to EEOC. Education's OCR plays a key role in ensuring compliance with Title IX because it has primary responsibility to investigate most types of complaints at educational institutions, including complaints referred from other federal agencies.

Although EEOC does not have any authority under Title IX, it does have authority under Title VII of the Civil Rights Act of 1964 to investigate sex-based complaints of employment discrimination, including sex discrimination against faculty and scientists. Even though Title IX regulations specifically include employment as a protected activity, agencies generally send all employment-related discrimination complaints to EEOC for investigation. EEOC officials told us that they process these complaints as Title VII complaints. As such, EEOC will review referrals from other federal agencies made under Title IX to see if they warrant investigation under Title VII.

The Department of Justice (Justice) was given authority under Executive Order 12250 for the "consistent and effective implementation" of several civil rights laws, including Title IX. Specifically, Justice is responsible for the coordination of agencies' enforcement of Title IX, including (1) reviewing and approving of agencies' regulations, (2) developing standards and procedures for conducting investigations and compliance reviews, (3) arranging for referral of cases between agencies, and (4) representing federal agencies in court proceedings. Justice consequently published a Final Common Rule in August 2000, which promulgated Title IX regulations adopted by 21 agencies, patterned after the Department of Education's Title IX regulations. Figure 1 broadly outlines the various complaint processes under Title IX.



**Figure 1: A Broad Outline of the Various Complaint Processes for Title IX**



Source: GAO analysis

The four science agencies we reviewed for this request—Education, Energy, NASA, and NSF—award billions of dollars in grants each year for mathematics, engineering, and science grants and projects. Combined, these four agencies awarded almost \$5 billion in grants for the sciences in fiscal year 2003. NASA, Energy, and NSF have been promoting scientific and technological research and programs in K-12 schools, higher education, and private industry for decades. Although Education’s mission encompasses more than scientific research, it has several programs dedicated to the sciences. One such program, Graduate Assistance in Areas of National Need, provides fellowships, through academic departments of institutions of higher education; these fellowships assist graduate students with excellent records who demonstrate financial need and who plan to pursue the highest degree available in a field designated as an area of national need. This program has designated biology, chemistry, computer and information science, engineering, geological science, mathematics, and physics as areas of national need. This program was funded at over \$30 million in fiscal year 2003. (See app. IV for a list of grants these agencies award for the sciences.)

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## The Four Federal Science Granting Agencies Made Efforts to Ensure Compliance, but Three Have Not Conducted Required Monitoring

The four federal science agencies have made efforts to ensure that federal grant recipients comply with Title IX in the sciences by performing several compliance activities, such as investigating complaints and providing technical assistance, but most have not monitored grantees as required by the law. Agency officials reported that Energy, NASA, and NSF refer complaints involving educational institutions to Education and those involving employment to EEOC, where they are investigated. Because grantees are not required to report on complaints filed with them, the agencies could not determine whether grantees have investigated Title IX sex discrimination complaints they have received. To encourage compliance with Title IX, federal agencies have provided grantees technical assistance and also require an assurance statement from every grantee that it will not discriminate. However, only Education has monitored its grantees by conducting periodic compliance reviews—an agency-initiated assessment of grantees to determine if they are complying with the law. The lack of grantee monitoring was, in part, because agencies have not effectively coordinated the implementation of compliance reviews and, according to agency officials, a shortage of resources to conduct the reviews.

**Table 1: Compliance Procedures Required by Title IX Law and Regulations**

	Investigate and resolve complaints	Require statement of assurance from grantees	Provide grantees with technical assistance	Periodically conduct compliance reviews
Education	✓ <ul style="list-style-type: none"><li>Investigates complaints it receives involving educational institutions and those referred from other agencies, including Energy, NASA, and NSF.</li><li>Refer complaints that solely involve employment discrimination to EEOC.</li></ul>	✓	✓	✓
Energy	✓ <ul style="list-style-type: none"><li>Refer complaints against educational institutions to Education.</li><li>Refer employment-related complaints to EEOC.</li></ul>	✓	✓	
NASA	✓ <ul style="list-style-type: none"><li>Refer complaints against educational institutions to Education.</li><li>Refer employment-related complaints to EEOC.</li></ul>	✓	✓	Has agreement with Education to conduct NASA's compliance reviews on educational institutions, but none have been done.
NSF	✓ <ul style="list-style-type: none"><li>Refer complaints against educational institutions to Education.</li><li>Refer employment-related complaints to EEOC.</li></ul>	✓	✓	

Source: GAO analysis.

**Federal Agencies Have Conducted Complaint Investigations, but They Are Unaware of the Extent to Which Grantees Conducted Investigations**

Each of the four agencies we reviewed has established a process to ensure that complaints made under Title IX are reviewed and addressed. Specifically, Education officials told us that it investigated or resolved all Title IX complaints it has received involving educational institutions, including those referred to it by other agencies through formal and informal agreements. Excluding athletic complaints, Education reported that it has received over 3,300 Title IX complaints against institutions of higher education since 1993. Some of these complaints were referred to Education by other agencies, including Energy, NASA, and NSF. Education officials told us that they are unable to determine which of the complaints concerned higher education programs in the sciences because their data

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management system does not track that information. Officials at Energy, NASA, and NSF told us that complaints meriting further investigation were referred to Education if they involved educational institutions or to EEOC if they were related to employment issues. However, officials at Energy, NASA, and NSF told us that they have received very few Title IX complaints each year. (See table 1 for information on compliance procedures required by Title IX.)

EEOC also has established procedures to review complaints made under Title IX, but the full number of complaints it has reviewed cannot be determined. Officials at EEOC told us that it has received some Title IX referrals, but since EEOC does not have statutory authority under Title IX, it reviews complaints to determine if Title VII of the Civil Rights Act of 1964 applies. Consequently, EEOC does not track which complaints originated as Title IX complaints, and it cannot determine how many Title IX complaints it has investigated under Title VII. Although EEOC investigates tens of thousands of complaints each year, officials told us that they cannot determine if their investigations involved scientists, or one of the four agencies, because EEOC's database does not track the employee's occupation or the department in which the complaint originated.

While grantees are required to establish procedures to resolve Title IX sex discrimination complaints, agencies could not determine whether they had done so because grantees are not required to report this information. Despite this requirement, there is some evidence that some grantees have not established these procedures. For example, Education recently reviewed the Title IX compliance status of selected grantees and found several instances in which grantees had not adopted or published complaint procedures. Recognizing this issue, Education issued a "dear colleague" letter in April 2004 to its grantees reminding them of their Title IX requirements to establish and publicize complaint procedures. Even if grantees have established procedures to address Title IX complaints, they may not be tracking the complaints they handle. Officials from every university we visited told us that they had an internal process to handle Title IX sex discrimination complaints, but a few were unable to provide us with actual numbers because they do not keep these data. Also, some officials told us that most complainants choose to file at the grantee level rather than with the federal government.

Students and university and laboratory officials we spoke with offered a number of reasons why there have been so few Title IX sex discrimination complaints involving the sciences filed with Education, Energy, NASA, and

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NSF. Specifically, many students and staff suggested that their peers would be unlikely to file a complaint because of a lack of awareness that Title IX covers academics. For example, scientists and students at most schools we visited told us that they thought Title IX covered only sports and did not know the law also encompassed academic issues. Also, others suggested they would be unlikely to file a complaint for fear of retribution from supervisors or colleagues. For example, some women faculty members we spoke with said that although they perceive that discrimination exists in their department, filing a complaint could hinder their ability to attain tenure. In addition, filing a sex discrimination complaint would take time away from their research.

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**Federal Agencies Required Statements of Assurance from Grantees and Provided Technical Assistance to Promote Compliance with Title IX**

Officials at federal agencies told us that they required statements of assurance from grantees and provided technical assistance to grantees upon request. Each agency required grantees to submit a statement of assurance that their education programs or activities are operated in compliance with Title IX, as well as with other civil rights laws, as part of their grant application. (See table 1.) In addition to obtaining these statements, agencies provide outreach materials or technical assistance to grantees. We found that each agency provided materials to grantees to help them better understand Title IX and its requirements. At Education, officials sometimes issue “dear colleague” letters to better inform grantees about how to fulfill Title IX requirements.

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**Required Compliance Reviews Have Largely Been Neglected**

We found that compliance reviews, which are required by Title IX regulations, have been largely neglected by agencies. Officials at three of the four agencies told us that they have not conducted any Title IX compliance reviews of their grantees. Education has conducted 17 compliance reviews of academic programs’ adherence to Title IX at institutions of higher education since 1993, 3 of which have dealt with the sciences. Education officials told us that each year they plan to conduct a number of reviews of compliance based on available funding remaining after they conduct complaint investigations and provide technical assistance to grantees. Officials reported that their goal is to use 20 percent of their budget for both outreach and reviews of compliance with federal laws, but in reality only about 15 percent of their budget goes toward these activities. When choosing which reviews would be conducted, officials reported that they identify compliance issues based on Education’s priorities and issues raised by Congress or interest groups. Specifically, Education officials told us that the three compliance reviews of science grantees—conducted in 1994 and 1995—were initiated because

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of congressional interest. This year, Education plans to conduct over 50 compliance reviews on issues related to special education and accommodations for the disabled. Officials told us that they are not conducting any compliance reviews involving Title IX this year. In addition to the requirement that Education conduct its own compliance reviews, Education has agreements with 17 other agencies to conduct compliance reviews of educational institutions under Title IX as well as other civil rights laws. However, Education officials stated that performing compliance reviews for other agencies was never feasible and that Education has informed those agencies that it could not conduct these reviews for them.<sup>6</sup>

Energy, NASA, and NSF officials reported that they have not conducted any Title IX compliance reviews of their grantees. Energy officials reported that they have provided their field office staff with guidance on conducting compliance reviews and that many field office staff attended training on compliance reviews offered by Justice. Energy officials also told us that they have conducted site visits to several field offices to determine if compliance reviews were being done, but found that no compliance reviews have been conducted, primarily due to resource constraints. While NASA has an agreement with Education for Education to conduct compliance reviews, neither Education nor NASA has conducted reviews of NASA's grantees. Recognizing this, NASA has begun to take steps toward ensuring that compliance reviews are conducted on their grantees. NASA officials reported that they are developing a compliance review program and have requested compliance information from all of their grantees. Officials reported that they are in the process of reviewing grantee responses to systematically ascertain if grantees are in compliance, identify problem areas, and assist in targeting grantees for possible on-site compliance reviews. Officials at NSF reported that a lack of funding and staff precludes development of a compliance review program. (See table 1.)

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<sup>6</sup>These agreements cover several civil rights laws, including Title VI, Title IX, and Section 504 of the Rehabilitation Act of 1973. Section 504 protects individuals from discrimination based on their disability. The nondiscrimination requirements of the law apply to employers and organizations that receive financial assistance from any federal department or agency. Section 504 forbids organizations and employers from excluding or denying individuals with disabilities an equal opportunity to receive program benefits and services. It defines the rights of individuals with disabilities to participate in, and have access to, program benefits and services.

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## Interagency Coordination of Compliance Activities Is Limited

Justice officials told us that it carries out three main activities to coordinate agency compliance with Title IX. Specifically, it provides technical assistance to agencies when questions arise about compliance activities or requirements, brokers agreements between agencies and Education to carry out complaint investigations and compliance reviews of educational institutions, and requires agencies to submit an annual report on their compliance activities. Some technical assistance has taken the form of published guidance for agencies to assist them with Title IX compliance, while other assistance is provided to agency officials directly to address specific issues. For example, Energy officials reported that they consult with Justice from time to time on how to handle complex complaints they receive.

Justice officials reported that they helped to arrange the agreements between Education and other agencies whereby Education has agreed to conduct complaint investigations and compliance reviews on behalf of the other agencies. Justice officials reported that they were not aware that Education has not been adhering to the compliance review portion of the agreements. However, Justice officials were aware that other agencies, including Energy, NASA and NSF, were not conducting compliance reviews as required, due to limited resources.

Justice officials reported that every agency submitted annual reports on their compliance activities. Agencies are required to report the numbers of complaints they received under Title VI and Title IX and what action was taken on those complaints. Agencies must also report on the total number of grants the agency awarded and whether those grantees completed a statement of assurance not to discriminate. In addition, agencies have to report and characterize any agreements they may have with other agencies, such as Education. Justice officials reported that they review these reports to determine gaps in compliance and subsequently provide agencies with guidance on how to alleviate those gaps. Although Executive Order 12250 requires Justice to coordinate the implementation and enforcement by executive agencies of various nondiscrimination provisions of several civil rights laws, including Title IX, it has no legal authority to make agencies conduct required compliance activities. Justice officials reported that aside from reminding the agencies of the need to comply with Title IX regulations and providing the agencies with guidance and technical assistance, there is little they can do to ensure compliance with Title IX.

In addition, Executive Order 12250 states “the Attorney General shall annually report to the President through the Director of the Office of

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Management and Budget on the progress in achieving the purposes of this Order. This report shall include any recommendations for changes in the implementation or enforcement of the nondiscrimination provisions of the laws covered by this Order.” However, Justice officials told us that this report has not been issued since 1998 because the reports were not an effective mechanism to encourage agency compliance with regulations.

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## Women’s Participation in the Sciences Has Increased Substantially since the Early 1960s, but Their Representation in Mathematics and Engineering Continues to Be Low

Women’s participation in the sciences has increased substantially in the last three decades, especially in the life sciences, such as biology. The proportion of women science students has grown, but to a lesser extent at the graduate level than the undergraduate level. Meanwhile, the proportion of faculty in the sciences who are women has also increased since the early 1970s. However, women still lag behind their male counterparts in terms of salary and rank, and much of their gain in numbers has been in the life sciences, as opposed to mathematics and engineering. A variety of studies indicate that experience, work patterns, and education levels can largely explain differences in salaries and rank. Studies also suggest that discrimination may still affect women’s choices and professional progress.

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## Women’s Participation in the Sciences Has Increased Substantially in the Last Three Decades

Although women’s participation in the sciences has improved steadily over the last three decades, men still outnumber women in nearly every field in the sciences. In 1960, women made up less than 3 percent of all scientists, but by 2003 women constituted nearly 20 percent of all scientists.<sup>7</sup>

Although the number of women increased in every field of science, the participation of women in scientific occupations varied by field, with women having the largest percentage gains in science and the smallest percentage gains in mathematics. In 1960 women constituted less than 1 percent of engineers, 8 percent of scientists, and 26 percent of mathematicians. By 2003 women made up 14 percent of engineers, 37 percent of scientists, and 33 percent of mathematicians.

Data on women in faculty positions at 2 and 4-year colleges and universities in 1999 indicate that women’s participation differs based on when they earned their PhD. Specifically, NSF data reveal that 11 percent of faculty at a 2 or 4-year college in 1999 who received their PhD in the

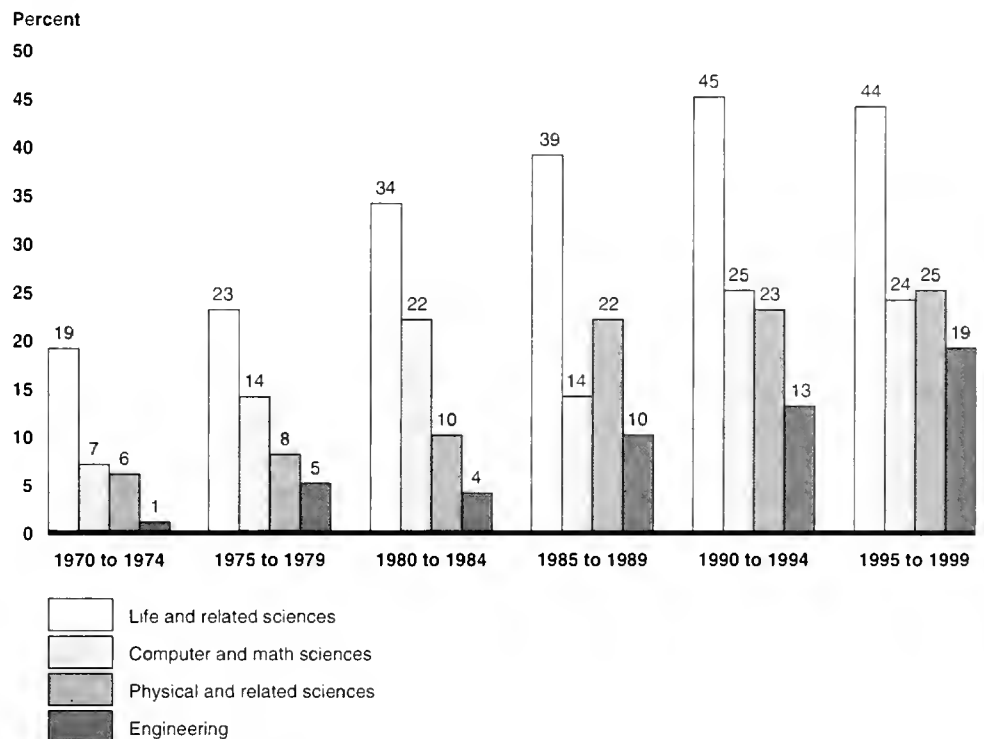
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<sup>7</sup>Bureau of Labor Statistics.



early 1970s were women, as were 34 percent who received their PhD in the late 1990s. Figure 2 shows that women working at 2- and 4-year colleges in 1999 have the greatest participation in life sciences. Nineteen percent of life sciences faculty at a 2 or 4-year college in 1999 who received their PhD in the early 1970s were women, as were 44 percent who received their PhD in the late 1990s. However, data show that women still constitute a relatively small share of faculty in the sciences. For example, engineering has the lowest participation levels for women faculty. Less than 1 percent of engineering faculty at a 2 or 4-year college in 1999 who received their PhD in the early 1970s were women, as were 19 percent who received their PhD in the late 1990s.

**Figure 2: Percentage of Women Science Faculty Employed at 2- and 4-Year Colleges and Universities in 1999 by Field of Study and Year of PhD Completion**



Source: NSF Survey of Doctorate Recipients.

Note: The estimates shown in this figure are based on sample data and subject to sampling error. For fields other than computer and math sciences, the 95 percent confidence intervals are within plus or minus 10 percentage points of the estimates. For computer and math sciences the 95 percent confidence intervals are within plus or minus 17 percentage points of the estimates.

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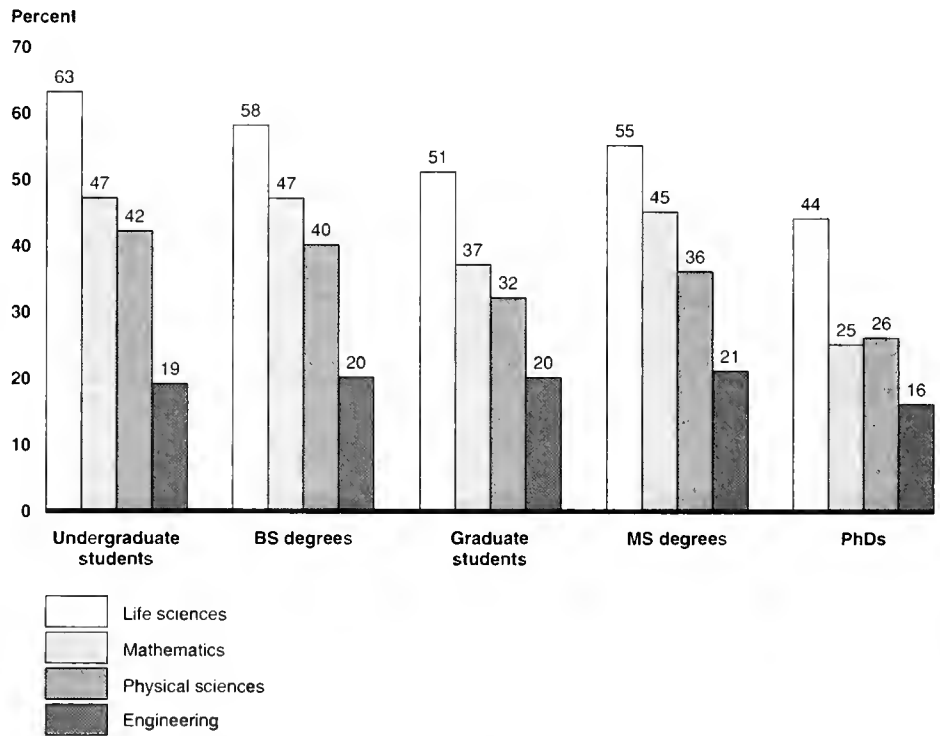
Women continue to major in the sciences and earn degrees in the sciences to a lesser extent than men, even though women now make up a majority of all college students. In 2000, two of five undergraduates in the sciences were women. Similarly, in 2000, while women made up over half of all graduate students, they accounted for less than a third of graduate students in the sciences.

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### Women Tend to Pursue More Degrees in Life Science and Fewer in Engineering and Mathematics

The percentage of women students differs across scientific fields, as shown in figure 3. In 1999-2000, women were a majority of both undergraduate and graduate students in life sciences, while only one-fifth of engineering students were women, at both the undergraduate and the graduate levels. Regarding degrees earned, the majority of degrees in fields other than the sciences, at all levels—bachelors, masters, and doctorates—are earned by women. However, with one exception, women continue to earn fewer degrees than men in the sciences, at all levels. Again, the exception is life sciences, in which women earned more bachelors and masters degrees—but not doctorate degrees—than men. The proportion of degrees in the sciences earned by women is highest in life sciences and lowest in engineering. (See app. VI for enrollment and degrees earned by men and women by field and level of study.)

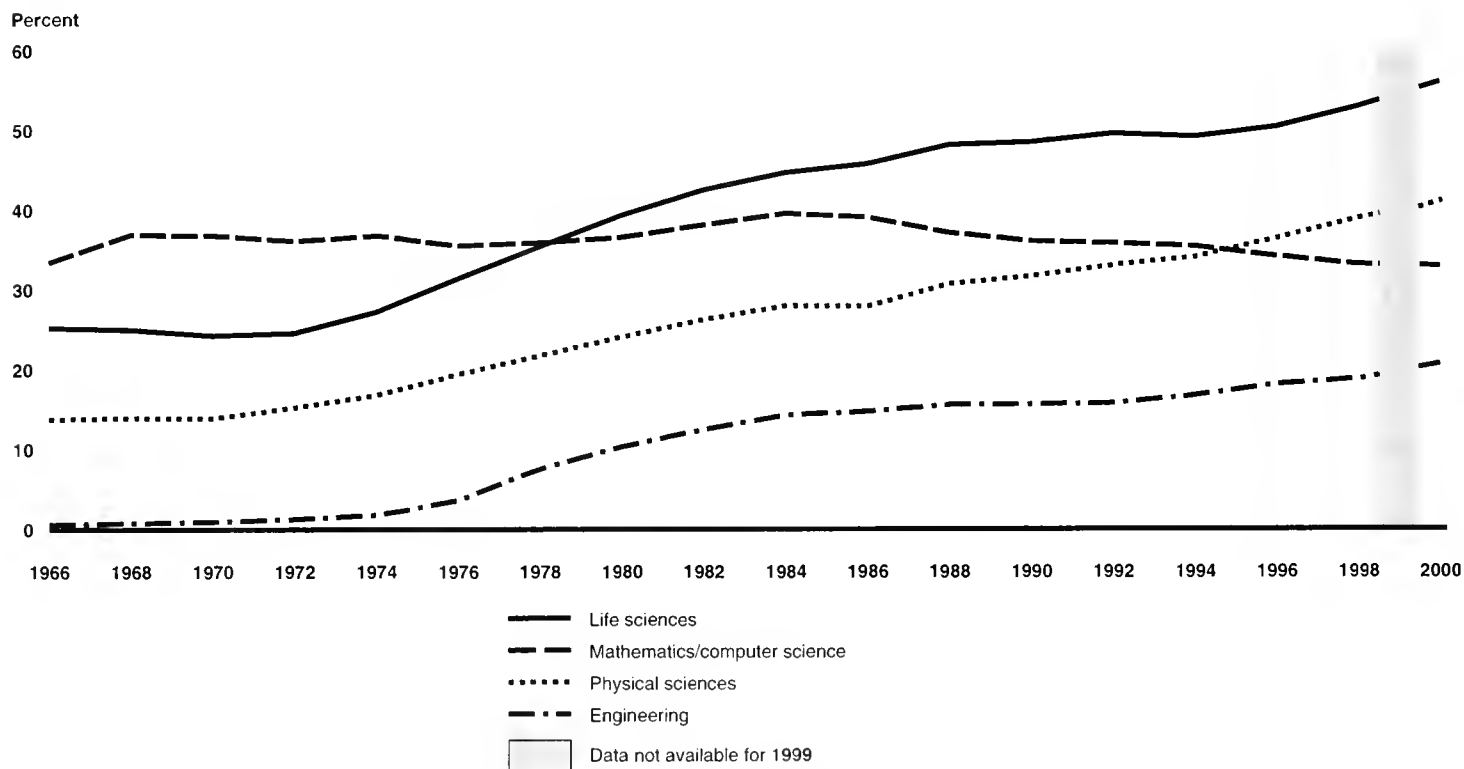
**Figure 3: Percentage of Students and Degree Recipients Who Are Women, 1999-2000**



Source: Education's Integrated Postsecondary Education Data System (IPEDS).

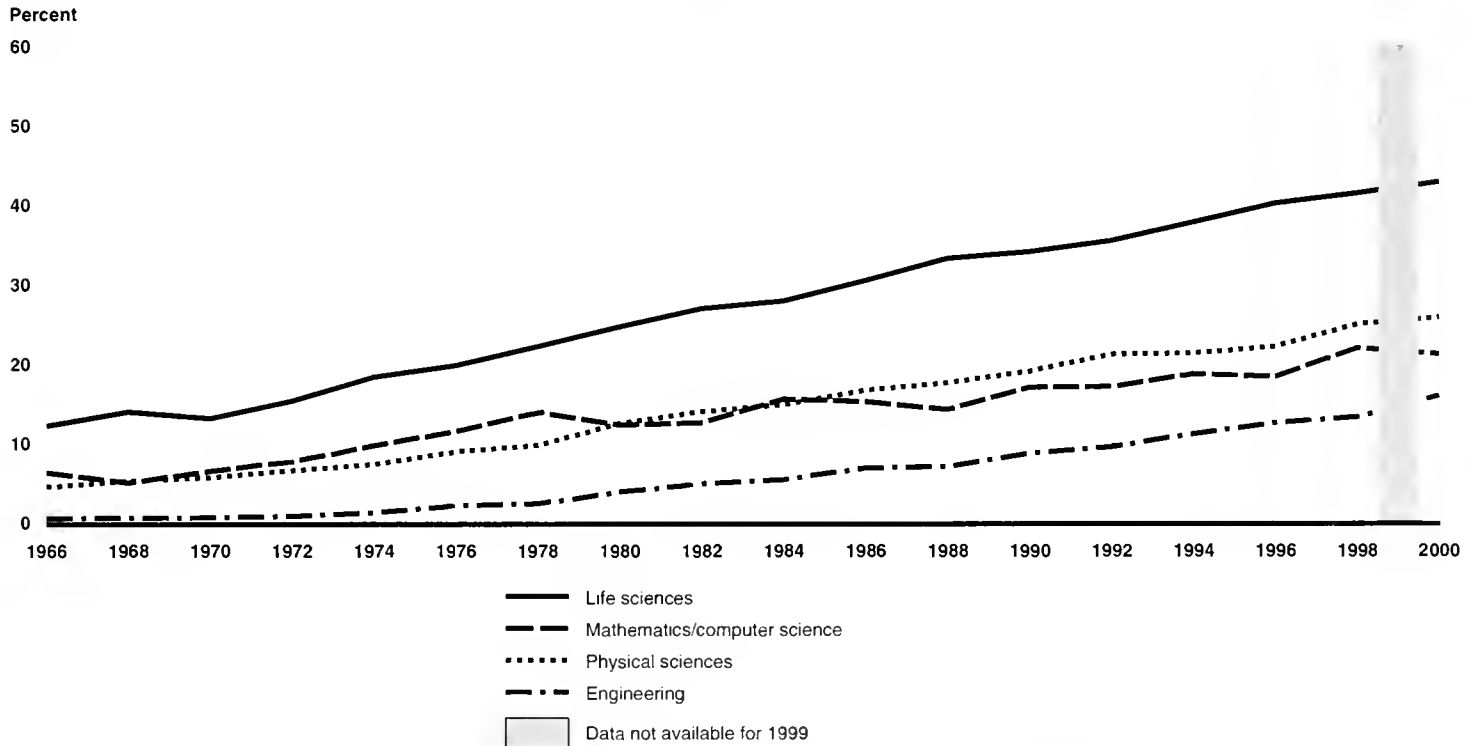
The proportion of bachelors degrees in various science areas awarded to women has grown relatively steadily since the mid-1960s, with the exception of degrees in mathematics, which fluctuated within the narrow range of 33 to 39 percent. (See fig. 4.) Similarly, the percentage of PhDs awarded to women has generally increased in these science fields, including mathematics, since 1966. Women made the greatest gains in life sciences. (See fig. 5.)

**Figure 4: Bachelors Degrees Earned by Women from 1966 to 2000**



Source: National Science Foundation, Division of Science Resources Statistics, Science and Engineering Degrees: 1966-2001, NSF 04-311, Project Officers, Susan T. Hill and Jean M. Johnson (Arlington, VA 2004).

**Figure 5: Doctoral Degrees Earned by Women from 1966 to 2000**



Source: National Science Foundation, Division of Science Resources Statistics, Science and Engineering Degrees, 1966-2001, NSF 04-311, Project Officers, Susan T. Hill and Jean M. Johnson (Arlington, VA 2004).

Some researchers suggest that the shortage of women pursuing degrees in science is due to a lack of preparation and mentoring. Recent research reported that women are not adequately prepared in K-12 or undergraduate school and so they lose interest in the sciences. According to several studies, in grade 12, high school girls took fewer courses in science, scored slightly lower on standardized science exams, were more likely to have negative attitudes toward science, and were less likely to declare science as a college major, as compared with high school boys.<sup>8</sup> Some of the women students and faculty with whom we talked reported that a strong mentor was a crucial part of their academic training. In fact, some students and faculty told us they had pursued advanced degrees because of the encouragement and support of mentors. Some felt that

<sup>8</sup>U.S. General Accounting Office, *Gender Equity: Men's and Women's Participation in Higher Education*, GAO-01-128 (Washington, D.C.: December 15, 2000).

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having women mentors, who served as role models, was important for women considering careers in the sciences. Some pointed out that with few faculty women in some departments in the sciences, it was hard for women students to find women mentors.

However, we found that women who begin college with an engineering, mathematics, or science major had similar rates of completing a bachelors degree within 6 years as their male counterparts, according to the Beginning Postsecondary Students (BPS) Longitudinal Study. About 65 percent of women did so in 2001, while 18 percent were still enrolled at the end of 6 years and about 17 percent left college without a degree. Comparably, about 62 percent of men completed a bachelors degree within 6 years, while about 19 percent were still enrolled at the end of 6 years and about 19 percent left college without a degree. Women who begin college with majors in the sciences had higher rates of completing a degree in 6 years than women who started college with other majors or undeclared majors. (See app. V for the enrollment status in 2001 of students who began postsecondary education in 1995, by type of initial major and sex.)

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## Salary and Rank Differences between Men and Women Scientists Are Largely Explained by Work Patterns and Choices

Several recent studies show that salary and rank differences between men and women can largely be explained by work patterns and choices. Even though the percentage of women in faculty positions has increased, many studies show that women faculty have not yet caught up with men faculty in several areas, including salary and tenure.<sup>9</sup> However, a recent study found that just over 91 percent of the discrepancy between men's and women's faculty salaries could be explained by differences in experience, work patterns, seniority, and education levels.<sup>10</sup> Our review of faculty data found that women science faculty compared with men faculty

- more often taught as their primary responsibility,
- less often conducted research as their primary responsibility,
- less often held a first professional degree or PhD,
- more often worked part-time,
- more often had less experience,
- more often were younger, and
- more often were native U.S. citizens.

Similarly, a recent study of the top 50 departments of engineering and science, as ranked by NSF, revealed that women faculty were more often associate or assistant professors than full professors and that women

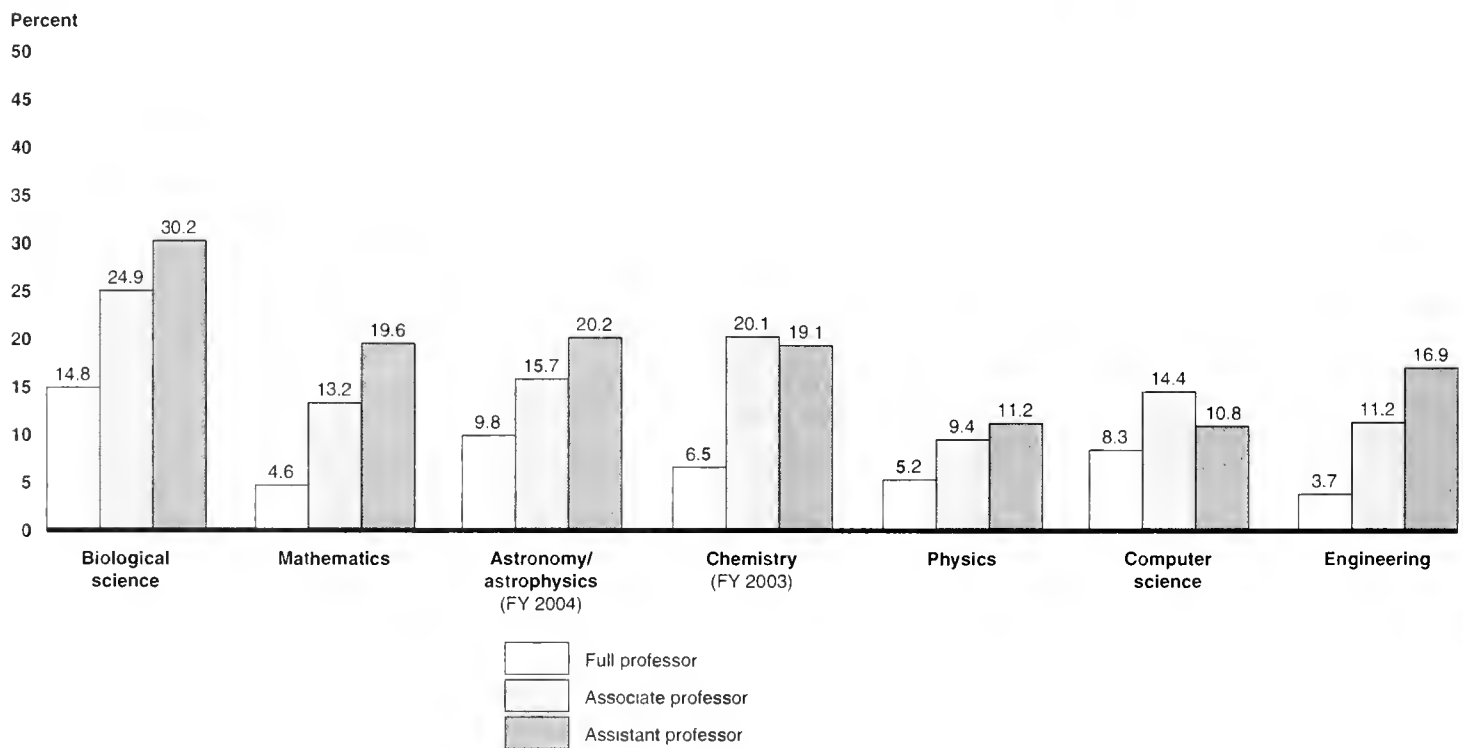
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<sup>9</sup>U.S. Department of Education, National Center For Education Statistics, *Salary, Promotion, and Tenure Status of Minority and Women Faculty in U.S. Colleges and Universities*, NCES 2000-173. (Washington, D.C.: March, 2000). U.S. Department of Education, National Center for Education Statistics, *Gender and Racial Ethnic Differences in Salary and Other Characteristics of Postsecondary Faculty: Fall 1998*, NCES 2002-170. (Washington, D.C.: September, 2002). U.S. General Accounting Office, *Women's Earnings: Work Patterns Partially Explain Difference between Men's and Women's Earnings*, GAO-04-35 (Washington, D.C.: October 31, 2003). Marcia L. Bellas, "Disciplinary Differences in Faculty Salaries: Does Gender Bias Play a Role?," *The Journal of Higher Education*; May/Jun 1997. Robert K Toutkoushian and Marcia L Bellas, "The Effects of Part-Time Employment and Gender on Faculty Earnings and Satisfaction," *The Journal of Higher Education*; Mar/Apr 2003. Report of the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development, *Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology* (Washington, D.C., September 2000). Massachusetts Institute of Technology, *A Study on the Status of Women Faculty in Science at MIT: How a Committee on Women Faculty Came to Be Established by the Dean of the School of Science, What the Committee and the Dean Learned and Accomplished, and Recommendations for the Future*; (Boston, MA, 1999).

<sup>10</sup>NCES 2002-170.

faculty were a minority of tenured faculty in the sciences.<sup>11</sup> Figure 6 shows that the percentage of women faculty by rank varies by field.

**Figure 6: Percentage of Women Faculty By Rank, Fiscal Year 2002**



Source: Nelson and Rogers, 2003.

Several studies have discussed that some women trade off career advancement or higher earnings for a job that offers flexibility to manage work and family responsibilities. In fact, a recent study on part-time faculty found that women faculty are 6 percent more likely than men to prefer part-time employment.<sup>12</sup> During our site visits, women faculty told us that juggling family life with a tenure track faculty position was extremely challenging. Some women told us that they felt discouraged from pursuing a tenure track university position because the biological

<sup>11</sup>Donna J. Nelson and Diana C. Rogers, *A National Analysis of Diversity in Science and Engineering Faculties at Research Universities*, (Norman, OK, 2003).

<sup>12</sup>Toutkoushian and Bellas, 2003.



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clock and the tenure clock tend to tick simultaneously.<sup>13</sup> Some faculty members told us that they felt they had to put off having children until they achieved tenure or entirely give up the goal of having children, choices that men faculty do not necessarily have to make. Others we spoke with commented that they observed the long hours and difficult work of professors at research universities in the sciences and felt they could not perform well while also devoting time to family responsibilities.

In addition, National Center for Education Statistics (NCES) found that men and women faculty also worked in different types of institutions. Among full-time faculty, women were more likely than men to work in 2-year institutions (33 percent versus 23 percent), while men were more likely than women to work in research universities (20 percent versus 14 percent).<sup>14</sup> Women PhD students we interviewed revealed that very few would seek tenure track positions at research institutions. Most said that they would rather become faculty at small colleges or scientists at a laboratory where they thought work pressures would be less intense and they could maintain a more healthy balance between work and family life.

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## Women May Also Face Practices That May Affect Their Participation

Studies have also argued that the variability in men and women's participation in the sciences may result from discrimination in the workplace or subtler discrimination about what types of career or job choices women can make. NCES recently reported that preparation is not the sole factor leading to women's low participation in science occupations but that workplace discrimination is a consistent barrier to women in the sciences. In addition, when studying women science faculty issues at MIT, researchers found that, after tenure, many senior women faculty began to feel "marginalized."<sup>15</sup> These faculty members reported that they sensed they may not have been treated equally with their men colleagues. During our site visits, some women faculty and students told us that the climate in some academic departments was changing for the better over time, as older men faculty, who were unused to working with

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<sup>13</sup>Most commonly, tenure decisions are made several years after appointment as assistant professor. In general, if an assistant professor does not get tenure, the professor must seek employment elsewhere. To achieve tenure in the sciences, high productivity in research and publication is required, time-consuming demands that many academics feel are incompatible with family formation and child-rearing.

<sup>14</sup>NCES 2002-173.

<sup>15</sup>Massachusetts Institute of Technology, 1999.

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women, retire. On the other hand, in other departments, women students reported that fellow men students were hostile to women and made it very uncomfortable for women to pursue their studies. Students and faculty we talked with reported that deans, department chairs, and other officials were attempting to bring about positive change for women on their campuses, but that progress would be slow.

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## Some Agencies and Grantees Have Activities That May Foster Greater Participation in the Sciences by Women

We found several examples of grant-making agencies that have instituted policies and practices designed to foster greater participation by women in the sciences. While some of the policies and practices are aimed at encouraging more women to pursue and to persist in education in the sciences, others provide time off and fewer teaching duties so junior faculty can balance work and family life while beginning a university career. Finally, a few policies and practices seek to expand the recruiting pool for jobs in the sciences and make them more attractive to women.

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## Grant-Making Agency Includes Evaluation Criteria to Encourage Greater Participation in the Sciences

NSF, as part of its formal evaluation of grant applications, uses a “second criterion,” the impact of the project on U.S. society. NSF makes a particular effort to recruit reviewers, experts in the substantive area of the proposal, from nonacademic institutions, minority-serving institutions, and disciplines closely related to the one addressed in the proposal. These reviewers evaluate grant proposals based on two merit criteria: first, what is the intellectual merit of the proposed activity; second, what are the broader societal impacts of the proposed activity. This second criterion includes promoting teaching, broadening the participation of underrepresented groups, and enhancing research infrastructure, such as facilities and partnerships, as well as the integration of diversity into NSF projects, and research mentoring, particularly for students typically underrepresented in the sciences.

Projects meeting NSF’s societal impact criterion may increase interest in the sciences among students or provide valuable experience to a diverse group of researchers, but to date there has not been a full evaluation of this criterion. Beyond the first year of graduate school, science education is largely laboratory centered. NSF grantees may take more care to include graduate students or other researchers from diverse backgrounds as staff on their projects. This could help ensure that women and minorities can get the training and experience they need to complete advanced degrees and work in an academic environment. However, the effects of implementing the second criterion have yet to be fully evaluated. A review

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by the National Academy of Public Administration in 2001 found that NSF does not have adequate data to track changes or improvements to encourage greater participation by underrepresented minority researchers.

In addition, researchers told us that many NSF supported projects include outreach components, frequently aimed at undergraduates and K-12 students. Often, analysts speak of an insufficient “pipeline” of women high school and college students planning to pursue higher levels of education in the sciences. The goal of outreach programs is to pique the interest of younger students in the sciences. Outreach activities can include speeches or demonstrations or work opportunities in a laboratory. These outreach activities may encourage some young women, who otherwise might have lost interest, to pursue education in the sciences.

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## Certain Practices Seek to Relieve Some of the Pressures for Women of Beginning a Tenure Track University Career

### Adjusted Tenure Clock

Some universities extend the tenure clock by one semester or one year when a junior faculty member has a child. Most commonly, tenure decisions are made several years after appointment as assistant professor. To achieve tenure in the sciences, high productivity in research and publication is required. As one faculty member expressed it, “the biological clock and the tenure clock are perfectly in sync.” Some female faculty put off children until after they gain tenure, often in their late 30s. Allowing junior faculty to “stop the clock” relieves some of the pressure on junior faculty seeking tenure. Many universities allow female faculty only 6 to 8 weeks of paid maternity leave.

At some universities, the tenure clock adjustment that comes with the arrival of a child applies to male faculty members as well. Some professors we spoke with told us that often male professors do not play as large a role as women in caring for newborns and can use the extra year to add to their research and publication portfolios. In addition, some junior faculty fear that stopping the clock will be counted against them in the tenure decision. Even though adjusting the tenure clock may be university policy, that policy may not be evenly implemented in all departments. Moreover, assistant professors seeking tenure must have many recommendations from established academics in their field, some of whom may not be aware

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that the tenure candidate stopped the clock. Therefore, some tenure recommendations may criticize resulting gaps in a résumé.

## Reduced Teaching Duties

Some universities, primarily major research institutions, relieve faculty members of one semester of teaching duties when a child is born or other urgent family issues arise. Some faculty we spoke with noted that there are events other than childbirth that require large amounts of a faculty member's time and attention, such as assisting elderly parents. Reduced teaching loads may operate in tandem with stopping the tenure clock and generally applies to both men and women professors.

Relief from teaching duties frees up time to deal with family issues and provides added flexibility in arranging work hours. However, when one is involved in scientific research, pressure remains to produce results. Researchers still have to run their laboratories. Scientists responsible for research projects have to organize the work, supervise graduate students working on the projects, and also advise students on their academic course work and projects. Some faculty we spoke with pointed out that relief from teaching duties may benefit male faculty more than female faculty. In connection with the arrival of a child, to the extent that male faculty may have less involvement in caring for newborns, male faculty may use the extra time to do additional research or laboratory work.

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## Several Practices Seek to Expand the Recruiting Pool for Scientific Jobs and Make Them More Attractive to Women

### On-site Child Care

Some universities and at least one laboratory we visited have developed or expanded on-campus child care or made arrangements with nearby facilities. Sometimes, when on-campus facilities are unavailable or inadequate, arrangements may be made with nearby child care providers to reserve a certain number of openings for faculty and staff. However, obtaining child care can still be a problem in some situations such as care for sick children. One laboratory we visited had plans for developing a separate day care facility for sick children, but it has not come about because of lack of funding.

Inclusive Hiring Processes	Universities may specify a search process for new faculty. Such a process might involve widespread advertising, might specify representation of women and minorities on search committees, and might require that there be members of underrepresented groups in the candidate pool. This type of formal process may extend the hiring time. However, if hiring pools, at first, are not sufficiently broad, further publicity and additional work by the search committee may be required.
Measuring Status of Women Faculty	Universities may also conduct periodic studies of recruiting, hiring, tenure decisions, salaries, and resources provided. These are among the aspects of university employment that can be quantified so comparisons can be made between male and female professors. Periodic reviews of such data can call the attention of the university or laboratory community to imbalances that may exist. Continuing review of such data helps ensure that inequities do not develop.
Addressing Climate Issues	Schools and laboratories can conduct periodic surveys of faculty concerns to develop information about factors such as inclusive social atmosphere, or sexist attitudes. Though not easily quantifiable, such factors nonetheless impact women's employment experience. Periodic surveys raise awareness of the university or laboratory community to attitudes and practices that may make it uncomfortable for women at the institution. University officials hope that greater awareness will help to avoid "marginalization" of female faculty and foster an inclusive atmosphere.
Funding Additional Education	Some laboratories subsidize the expenses of obtaining additional education and training for their current employees. Further education may lead to promotions or higher-level work. Such support is not limited to women, but at one laboratory we visited, a high proportion of beneficiaries were women.
Flexible Work Schedules	Some laboratories allow part-time or flexi-time schedules, allowing staff to vary their arrival and departure times. Additionally, at least one laboratory we visited allowed job sharing, whereby two employees each work on the same job on a part-time basis, coordinating closely with one another to accomplish the assigned tasks. Each of these alternative work arrangements helps workers balance their personal lives with their work lives and makes it easier for researchers to deal with family responsibilities, which some scientists told us are often borne more by women than men.

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## Conclusions

Over the past three decades, women have made substantial gains as professionals in the sciences, particularly in the life sciences. A review of their numbers and roles today in the educational pipeline suggests, however, that women will continue to fall short of equal participation. Their lower levels of participation also suggest that they remain a less than well tapped resource in the nation's growing demand for scientists.

Our review of federal science agencies' oversight for Title IX suggests that much of the leverage afforded by this law lies underutilized in the science arena, even as several billion dollars are spent each year on federal science grants. Although Energy, NASA, and NSF have carried out most of the activities required of them under Title IX, the impact of their work may be limited without compliance reviews of grantees and their practices. Given the general lack of knowledge and familiarity with the reach of Title IX and the disincentives for filing complaints against superiors, investigations of complaints alone by federal agencies are not enough to judge if discrimination exists. Without making full use of all compliance activities available, agencies lack a complete picture of federal grantee efforts to address occurrences of sex discrimination. On the other hand, a more aggressive exercise of oversight on the part of agencies that wield enormous influence in the world of science funding—Energy, NASA, and NSF—would provide an opportunity to strengthen the goal of Title IX and enable this legislation to better achieve intended results.

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## Recommendations for Executive Action

To fully comply with Title IX regulations, we recommend the Secretary of Energy and Director of NSF ensure that compliance reviews of grantees are periodically conducted.

To fully comply with Title IX regulations, we recommend the Administrator of NASA continue to implement its compliance review program to ensure that compliance reviews of grantees are periodically conducted.

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## Agency Comments and Our Evaluation

We provided a draft of this report to the Department of Education, the Department of Energy, the Department of Justice, the National Aeronautics and Space Administration, and the National Science Foundation for review and comment. Officials at each agency confirmed that they had reviewed the draft and generally agreed with its findings and recommendations. Officials from all five agencies provided us with technical comments, many of which we have incorporated into the report, and formal comments from Education, Energy, NASA and NSF are

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included in appendixes VII through X. Justice did not provide formal written comments for this report.

As discussed in their formal comments and in our report, Energy, NASA, and NSF have begun to take steps, such as providing technical assistance and collecting compliance information from grantees, to ensure greater compliance with Title IX. Although officials at these agencies agree that compliance reviews have not been conducted, officials from each agency reported that they are making efforts to carry out compliance reviews in the future. Where appropriate, we incorporated information about agency efforts in the final version of this report.

In the comments from Education, officials reported about compliance reviews and other efforts that Education has conducted on school districts and on nonscience programs at institutions of higher education. While we agree that these efforts may provide greater access for women in higher education science programs, as they may for women in other fields, they were not within the scope of our review and, therefore, were not included in this report.

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We are sending copies of this report to the Secretary of Education, the Secretary of Energy, the Attorney General, the Administrator of NASA, the Acting Director of NSF, appropriate congressional committees, and other interested parties. In addition, the report will be available at no charge on GAO's Web site at <http://www.gao.gov>. Please call me at (202) 512-8403 if you or your staff have any questions about this report. Other major contributors to this report are listed in appendix XI.

Cornelia M. Ashby

A handwritten signature in black ink that reads "Cornelia M. Ashby". The signature is written in a cursive, flowing style.

Director, Education, Workforce  
and Income Security

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# Appendix I: Objectives, Scope, and Methodology

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Because of increased interest about women's access to mathematics, engineering, and science, which receive billions of dollars in federal assistance, you asked us to determine what is being done to ensure compliance with Title IX in regard to mathematics, engineering, and science. This report addresses: 1) how do the Department of Education (Education), the Department of Energy (Energy), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF) ensure that federal grant recipient institutions comply with Title IX in mathematics, engineering, and science; 2) what do data show about women's participation in these fields; and 3) what promising practices exist to promote their participation?

We reviewed the legislation and regulations to identify all areas of compliance relevant to each federal agency. We interviewed officials at Education, Energy, NASA, and NSF and gathered documentation to identify agency activities to ensure compliance with Title IX. We analyzed data from the Office for Civil Rights (OCR) at Education and the Equal Employment Opportunity Commission (EEOC), the agencies where most sex discrimination complaints are filed. Given its role as coordinating agency of Title IX compliance, we also gathered data and interviewed officials at the Department of Justice (Justice).

We chose to visit research universities and national laboratories because by visiting those institutions we were able to interview future and practicing scientists working in a wide variety of areas. During this phase of the review, we visited seven research universities where we interviewed grant recipients, students and faculty. We also visited six national laboratories where we talked with administrators and scientists. Research universities were selected for site visits because they received grants from at least three of the four agencies we reviewed and were near at least one national laboratory and another research university that also met our criteria. Those selected were:

- Clemson University,
- Columbia University,
- Duke University,
- Stanford University,
- State University of New York at Stony Brook,
- University of California, Berkeley, and
- University of South Carolina.



Laboratories selected were:

- Brookhaven National Laboratory,
- Environmental Measurements Laboratory,
- Lawrence Berkeley National Laboratory,
- Lawrence Livermore National Laboratory,
- Savannah River Ecology Laboratory, and
- Savannah River National Laboratory.

To gather nationwide information on women's participation and experiences in mathematics, engineering, and science, we analyzed data from the Integrated Postsecondary Education Data System (IPEDS), the Beginning Postsecondary Students (BPS) Longitudinal Study, and the National Study of Postsecondary Faculty (NSOPF) from Education and the Survey of Earned Doctorates (SED), and the Survey of Doctorate Recipients (SDR) from NSF. We also reviewed literature to obtain information about women in the sciences and issues they face preparing for and pursuing careers in the sciences. In addition, we spoke with practitioners regarding promising practices to promote the participation of women in mathematics, engineering, and science. To assess the reliability of the various Education and NSF data sources, we reviewed documentation on how the data were collected and performed electronic tests to look for missing or out-of-range values. In addition, we reviewed the methodology of studies and reports using generally accepted social science principles as a basis for including their results in our report. Based on these reviews and tests, we found the data and studies sufficiently reliable for our purposes. We conducted our review from July 2003 through June 2004 in accordance with generally accepted government auditing standards.

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# Appendix II: National Laboratories and Technology Centers

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Albany Research Center  
Ames Laboratory  
Argonne National Laboratory (East)  
Brookhaven National Laboratory  
Environmental Measurements Laboratory  
Fermi National Accelerator Laboratory  
Idaho National Engineering Laboratory  
Lawrence Berkeley National Laboratory  
Lawrence Livermore National Laboratory  
Los Alamos National Laboratory  
National Energy Technology Laboratory  
National Petroleum Technology Office  
National Renewable Energy Laboratory  
New Brunswick Laboratory  
Oak Ridge Institute for Science and Education  
Oak Ridge National Laboratory  
Pacific Northwest National Laboratory  
Princeton Plasma Physics Laboratory  
Radiological and Environmental Sciences Laboratory  
Sandia National Laboratory  
Savannah River Ecology Laboratory  
Savannah River National Laboratory  
Stanford Linear Accelerator Center  
Thomas Jefferson National Accelerator Facility

# Appendix III: Selected Legal Events and Cases Involving Title IX

Year	Event/case	Description
1972	Title IX enacted <sup>a</sup>	First federal law specifically prohibiting sex discrimination at educational institutions receiving federal financial assistance.
1975	Publication of Education's final regulations on Title IX <sup>b</sup>	Responded to nearly 10,000 public comments, most concerning athletics
1979	<i>Cannon v. University of Chicago</i> <sup>c</sup>	Held that private parties may file suit in Title IX cases.
1980	Executive Order 12250	Delegated to Justice authority to coordinate the implementation and enforcement by federal agencies of various nondiscrimination provisions, including Title IX.
1984	<i>Grove City College v. Bell</i> <sup>d</sup>	Held that Title IX applied only to programs that directly receive or benefit from federal financial assistance.
1987	Civil Rights Restoration Act <sup>e</sup>	Requires all programs of an educational institution receiving federal funds to be subject to Title IX, superseding the <i>Grove City College v. Bell</i> decision.
1992	<i>Franklin v. Gwinnett County Public Schools</i> <sup>f</sup>	Held that monetary damages are available to plaintiffs in private Title IX actions.
1997	OCR sexual harassment policy guidance <sup>g</sup>	Provided policy guidance on Title IX prohibitions against sexual harassment in schools.
2000	Publication of final common rule regulations on Title IX <sup>h</sup>	Provided Title IX enforcement regulations for 21 agencies

Source: GAO analysis.

<sup>a</sup>20 U.S.C. §§ 1681-1688.

<sup>b</sup>45 C.F.R. Part 86, currently found at 34 C.F.R. Part 106.

<sup>c</sup>441 U.S. 677 (1979).

<sup>d</sup>465 U.S. 555 (1984).

<sup>e</sup>20 U.S.C. § 1687.

<sup>f</sup>503 U.S. 60 (1992).

<sup>g</sup>Department of Education, OCR, "Sexual Harassment Guidance: Harassment of Students by School Employees, Other Students, or Third Parties," 52 Fed. Reg. 12034 (Mar. 13, 1997). On Nov. 2, 2000, OCR published in the Federal Register for a 30-day comment period "Revised Sexual Harassment Guidance: Harassment of Students by School Employees, Other Students, or Third Parties." This revises OCR guidance in light of recent Supreme Court cases relating to sexual harassment in schools. See *Gebser v. Lago Vista Independent School District*, 524 U.S. 274 (1998), and *Davis v. Monroe County Board of Education*, 526 U.S. 626 (1999).

<sup>h</sup>65 Fed. Reg. 52858 (Aug. 30, 2000).

# Appendix IV: Mathematics, Engineering, and Science Grant Programs Funded by Education, Energy, NASA, and NSF

Agency	Engineering, Mathematics, or Science Program	2003 obligations
NSF	Engineering grants	\$541,700,000
	Mathematical and physical sciences	\$1,040,700,000
	Geosciences	\$691,840,000
	Computer and information science and engineering	\$589,290,000
	Biological sciences	\$570,490,000
	Social, behavioral, and economic sciences	\$198,610,000
	Education and human resources	\$934,880,000
	Polar programs	\$110,400,000
	<b>Total</b>	<b>\$3,638,250,700</b>
NASA	Aerospace education services program	\$6,568,748
	Technology transfer	<sup>b</sup> \$51,707,000
	<b>Total</b>	<b>\$58,275,748</b>
Energy	Used energy-related laboratory equipment grants	<sup>a</sup>
	Inventions and innovations	\$2,632,950
	National energy information center	<sup>a</sup>
	Office of science financial assistance program	\$515,000,000
	University coal research	\$135,481,041
	Office of scientific and technical information	\$6,900,000
	Nuclear waste disposal siting	\$11,451,007
	Regional biomass energy programs	\$2,889,000
	Conservation research and development	<sup>a</sup>
	Renewable energy research and development	<sup>a</sup>
	Fossil energy research and development	\$247,990,587
	Office of technology development and deployment for environmental management	<sup>b</sup> \$60,000,000
	National industrial competitiveness through energy, environment and economics	<sup>b</sup> \$1,500,000
	Epidemiology and other health studies financial assistance program	\$18,000,000
	Stewardship science program	\$10,949,075
	Defense nuclear nonproliferation research	\$4,000,000
	University reactor infrastructure and education support	\$18,500,000
	Science and engineering training to support diversity-related programs	\$300,000
	Energy efficiency and renewable energy information dissemination, outreach, training and technical analysis/assistance	\$0
	State energy program special projects	\$17,320,255
	Nuclear energy research, development, and demonstration	<sup>a</sup>
	<b>Total</b>	<b>\$1,052,913,915</b>

Appendix IV: Mathematics, Engineering, and  
Science Grant Programs Funded by  
Education, Energy, NASA, and NSF

Agency	Engineering, Mathematics, or Science Program	2003 obligations
Education	Minority science and engineering improvement	\$8,942,000
	Graduate assistance in areas of national need	\$30,798,000
	Eisenhower regional mathematics and science education consortia	<sup>b</sup> \$15,000,000
	Preparing tomorrow's teacher to use technology	<sup>b</sup> \$62,094,000
	Mathematics and science partnerships	\$100,344,000
	Total	\$129,334,000

Source: Catalogue of Federal Domestic Assistance

<sup>a</sup>Obligations were not separately identifiable.

<sup>b</sup>Estimated.

# Appendix V: Comparison of Enrollment Status

Data from the Beginning Postsecondary Students (BPS) Longitudinal Study show that for those who started with a major in the sciences, there is no appreciable difference between men and women in the proportion that have completed a bachelors degree 6 years after starting college. Among those who started college with nonscience or undeclared majors, a greater proportion of women than men had achieved bachelors degrees within 6 years. For both men and women, those who began college majoring in the sciences were more likely to have earned degrees within 6 years than those who began college with nonscience or undeclared majors.

Table 2: Enrollment Status in 2001 of Students Who Began Postsecondary Education in 1995, by Type of Initial Major and Sex

	Completed Bachelors		Did not complete, still enrolled		Did not complete, not enrolled		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Major in the sciences								
Men	79,462	61.6	24,634	19.1	24,955	19.3	129,051	100
Women	56,371	65.3	15,518	18	14,446	16.7	86,335	100
Both sexes	135,833	63.1	40,152	18.6	39,401	18.3	215,386	100
Major not in the sciences or undeclared								
Men	254,169	52.9	88,318	18.4	138,033	28.7	480,520	100
Women	403,000	60.6	100,537	15.1	161,430	24.3	664,967	100
Both sexes	657,169	57.4	188,855	16.5	299,463	26.1	1,145,487	100
Total								
Men	333,631	54.7	112,952	18.5	162,988	26.7	609,571	100
Women	459,371	61.1	116,055	15.4	175,876	23.4	751,302	100
Both sexes	793,002	58.3	229,007	16.8	338,864	24.9	1,360,873	100

Source: BPS.



# Appendix VI: Comparison of Enrollment and Degrees Earned

Data from the Integrated Postsecondary Education Data System (IPEDS) show that the proportion of students, and of degree earners, who are women varies substantially from one area to another in the sciences.

Table 3: Enrollment and Degrees Earned by Men and Women by Field and Level of Study, 1999-2000.

	Undergraduate enrollment, 2000			Bachelors degrees awarded, 2000		
	men	women	% women	to men	to women	% to women
Engineering	486,840	117,674	19	46,493	11,882	20
Life sciences	196,570	329,050	63	26,413	36,925	58
Mathematics	47,564	42,074	47	6,381	5,685	47
Physical sciences	86,760	62,706	42	10,860	7,340	40
Other	1,187,524	1,567,100	57	433,841	636,107	59
Total	2,005,258	2,118,604	51	523,988	697,939	57



Appendix VI: Comparison of Enrollment and Degrees Earned

Graduate enrollment 2000			Masters degrees awarded 2000			Doctorates awarded 2000		
men	women	% women	to men	to women	% to women	to men	to women	% to women
76,467	18,666	20	20,282	5,302	21	4,544	834	16
22,305	23,354	51	2,766	3,409	55	2,686	2,119	44
8,758	5,218	37	1,878	1,530	45	830	275	25
24,911	11,961	32	3,110	1,712	36	2,992	1,024	26
228,151	350,677	61	158,974	247,447	61	13,850	15,408	53
360,592	409,876	53	187,010	259,400	58	24,902	19,660	44

Source: IPEDS.

# Appendix VII: Comments from the Department of Education



UNITED STATES DEPARTMENT OF EDUCATION  
OFFICE OF THE ASSISTANT SECRETARY FOR CIVIL RIGHTS

July 2, 2004

Ms. Cornelia M. Ashby  
Director, Education, Workforce,  
and Income Security Issues  
United States General Accounting Office  
Washington, D.C. 20548

Dear Ms. Ashby:

Thank you for this opportunity to comment on the GAO draft report entitled *Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX* (GAO-04-639).

I am pleased that your report acknowledges the Department of Education's extensive activities under Title IX of the Education Amendments of 1972 to monitor the compliance with Title IX of recipients of federal financial assistance through assurances of compliance, technical assistance, complaint investigations, and periodic compliance reviews. The report makes no recommendations for further action from the Department of Education, and a careful reading of the full report makes it clear that the Department of Education has done everything required by the Title IX regulations. On occasion the report lumps the four federal agencies studied together, and refers to them as "the federal science agencies." Unfortunately, in some of the summaries, conclusions, and the synopses printed in the left-hand column, the report makes general statements about "the federal science agencies" failing to conduct compliance reviews, which may be appropriate for the other agencies but is not an accurate reflection of the report's findings regarding the Department of Education.

I would also like to take this opportunity to put the number of compliance reviews reported for the Department of Education in a broader perspective. This report on Title IX is narrowly focused on women in math and science in the postsecondary education setting. The report correctly finds that the Department of Education has done three compliance reviews since FY 1993 of postsecondary education institutions focused specifically on math and science. However, these three reviews are the narrow intersection of the Department's larger efforts in women in math and science and women in postsecondary education. Since FY 1993, the Department has conducted a total of 15 reviews in the area of women in math and science, but 12 of the reviews were at the secondary level addressing the "pipeline" issues raised in this report. Since the reviews were not of postsecondary institutions, they were not reported. Similarly, since FY 1993 the Department has conducted 17 non-athletics Title IX compliance reviews of postsecondary institutions on issues such as sexual harassment, grievance procedures, due

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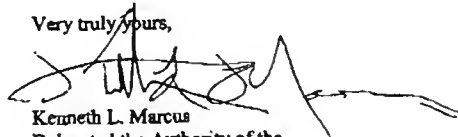
Page 2 – Ms. Cornelia M. Ashby

process, and support services. These also were not reported because the focus was not specifically on math and science. However, these reviews would have had all the same benefits for the women in math and science as for the women in other fields of study.

The Department has also recently conducted 26 compliance reviews of state Departments of Education to ensure that Title IX Coordinators have been designated and trained, and that Title IX nondiscrimination policy and contact information for the Title IX Coordinators has been published in accordance with the Title IX regulations.

I have enclosed with this letter a list of technical comments and corrections, many of which have already been shared informally with your staff. If there are any questions regarding these comments and corrections, please feel free to contact Steve Cramolini at 202-245-6713.

Very truly yours,



Kenneth L. Marcus  
Delegated the Authority of the  
Assistant Secretary for Civil Rights

Enclosure

# Appendix VIII: Comments from the Department of Energy



## Department of Energy

Washington, DC 20585

June 29, 2004

Ms. Cornelia M. Ashby  
Director for Education Workforce  
And Income Security  
General Accounting Office  
441 G Street, NW  
Washington, DC 20548

Dear Ms. Ashby:

The Department of Energy has reviewed the proposed report, "Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX". We provide the following comments on behalf of the Department.

### GAO Finding:

That compliance reviews which are required by Title IX regulations have been largely neglected by agencies. Officials at three of the four agencies told us that they have not conducted any Title IX compliance reviews of their grantees.

### DOE COMMENT:

Over the last several years, the Department of Energy (DOE) has acted aggressively to ensure that applicants and recipients of Federal financial assistance are in compliance with Title IX, as well as other civil rights statutes and regulations that prohibit discrimination by recipients of Federal financial assistance. DOE's Office of Civil Rights and Diversity (OCD) has developed a comprehensive compliance monitoring and oversight program consisting, among other things, of issuing a DOE policy, providing policy guidance, training, pre-award reviews, and outreach and publication.

DOE has sixteen (16) field Equal Employment Opportunity and Diversity Offices which are responsible for Title IX civil rights enforcement applicable to recipients of financial assistance from DOE. The Headquarters Office of Civil Rights and Diversity (OCD) has oversight responsibility of the 16 field offices. DOE's actions to ensure compliance with Federal law in this area include the following.

First, in January 2000, the Secretary issued a policy statement to all Department Heads setting forth DOE's Policy of non-discrimination in Federally assisted programs and Activities. The policy reaffirms DOE's commitment to ensuring that recipients of assistance from DOE do not discriminate, and tasks each departmental element with taking steps to ensure that recipients of departmental assistance comply with all applicable laws pertaining to financial assistance, including with Title IX of the



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Education Amendments of 1972.

Second, in September 2000, the Director, OCRD, issued a memorandum to all EEO/Diversity Managers regarding the need for conducting civil rights compliance reviews. The memorandum sets forth the Departments' civil rights responsibilities and the requirements that OCRD conduct field reviews of the field office's responsibilities and efforts to ensure compliance with Federal law by recipients of financial assistance.

Third, in September 2000, the Office of Civil Rights and Diversity also published and disseminated a handbook entitled, *Conducting Compliance Reviews of Federally Assisted Programs*. This handbook was disseminated to all Diversity Managers having enforcement responsibilities under Title IX and other civil rights statutes. In addition, on October 23 and 24, 2002, OCRD sponsored civil rights training for its Diversity Managers. The Department of Justice, Coordination and Review Section, conducted the training. Twelve (12) of the 16 field EEO/Diversity Managers received the training, as well as some headquarters and procurement staff. The training dealt primarily with Title VI, however, DOE's Title IX and Title VI complaint processing regulations are the same.

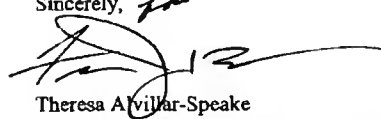
Fourth, since July 2000, OCRD has conducted civil rights compliance reviews at ten (10) of the Department's 16 field offices. The aim of the reviews has been to assess the adequacy and effectiveness of each field offices' civil rights compliance program, including its system of enforcement and oversight of recipients of Federal financial assistance, including Title IX. OCRD has dedicated one staff person as a reviewer of the field office Title IX program of enforcement. The reviewer evaluates the program of pre-award and post-award compliance, notification and outreach programs, and the field offices' complaint processing program. While the field offices have not conducted Title IX field compliance reviews, OCRD has reminded each field office reviewed of its obligation to conduct such compliance reviews of its grantees. Field office managers, procurement and EEO/Diversity managers have consistently, however, stated that they lack the staffing and office resources to conduct civil rights compliance reviews of their grantees.

Fifth, in fiscal year 2002, the Department awarded 1724 grants and cooperative agreements. The Department conducted 732 pre-award reviews, of which 48 were desk audits. DOE's pre-award process consists of obtaining a DOE FORM 1600.5, *Assurance of Compliance*, executed and dated by the authorized official, and in many cases, a questionnaire is completed by the recipient. The pre-award review is an important part of the compliance process, in that it assures that the recipients are meeting the requirements of DOE's regulations governing nondiscrimination at the time the award is made.

In addition, the Department headquarters procurement office includes in its grant packages a Title IX brochure developed by the Office of Civil Rights and Diversity entitled, *Nondiscrimination on the Basis of Sex in Federally Assisted Programs*. A poster is also made available to recipients entitled, *Equal Opportunity: It's the Law!*

Finally, we note that while the post-award review process is part of OCRD's overall program for ensuring compliance with Federal law by recipients of financial assistance, OCRD has attempted to maximize the use of its limited resources up front in the pre-award review process before awards are made. Nonetheless, DOE intends to re-evaluate its current program and - resource permitting - undertake post-award review of recipients of Federal financial assistance, as appropriate.

Sincerely, *for*

A handwritten signature in black ink, appearing to read 'Theresa A. Villar-Speake', with a long horizontal flourish extending to the right.

Theresa A. Villar-Speake  
Director  
Office of Economic Impact and Diversity

# Appendix IX: Comments from the National Aeronautics and Space Administration

National Aeronautics and  
Space Administration  
Office of the Administrator  
Washington, DC 20546-0001



July 13, 2004

Mr. Bryon Gordon  
Assistant Director, Education Workforce  
and Income Security Group  
U.S. General Accounting Office  
441 G Street NW  
Rm. 5C47  
Washington, DC 20548

Dear Mr. Gordon:

NASA appreciates the opportunity to comment on the draft General Accounting Office (GAO) report entitled, "Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX" (GAO-04-639).

We agree generally with the report's recommendation that "the Administrator of NASA implement its compliance review program to ensure that compliance reviews of grantees are periodically conducted," but suggest that the recommendation be revised to recognize steps we have already taken to address the issues you raise.

The following paragraphs provide the suggested revisions to the report's recommendation regarding NASA, as well as the current status and planned approach for addressing this recommendation.

**Recommendation:** GAO recommends that to fully comply with Title IX regulations the NASA Administrator should implement its compliance review program to ensure that Title IX compliance reviews of grantees are periodically conducted.

This recommendation is consistent with current NASA policy on its administrative mandates regarding equal opportunity in NASA assisted and conducted programs and activities. This recommendation validates and reinforces the importance of activities already underway at NASA to improve our compliance program for Title IX of the Education Amendments Act of 1972.

We believe that NASA, while still pursuing important improvements in our compliance activities regarding Title IX and other grant related equal opportunity laws, has already made significant improvements in its Title IX compliance program. To more accurately describe our progress in implementing Title IX compliance policy, we recommend revising the proposed recommendation in the following manner:

"To fully comply with Title IX regulations the NASA Administrator should continue to implement the Agency's compliance review program to ensure that onsite compliance reviews of grantees are periodically conducted."

During the past year, NASA has taken steps to reactivate its previously dormant Title IX compliance program. In FY 2003, NASA began implementing its Title IX compliance program through a desk audit review of grantee compliance with Title IX regulatory provisions. In June 2003, NASA published in the Federal Register a Notice of Request for Information, stating that the information collected would be "analyzed and used by NASA to determine NASA grant recipients' compliance with Title IX of the Education Amendments of 1972." 68 Fed. Reg. 37866 (June 25, 2003).

In December 2003, the NASA principal compliance officer for Title IX issued a letter to all NASA grant recipients requesting information on whether the recipient had, pursuant to Title IX requirements: (1) designated an employee to act as the "Title IX coordinator;" (2) adopted and published internal grievance procedures to promptly and equitably resolve complaints alleging discrimination on the basis of sex in its education programs or activities; 3) taken specific steps to regularly and consistently notify the public, i.e., participants, employees, applicants, etc., that it does not discriminate on the basis of sex in the operation of its education programs and activities, and (4) conducted a self-evaluation to evaluate current policies and practices and the effects of such policies and practices on the admission and treatment of students, and the employment of academic and non-academic personnel working in connection with the recipient education program or activity.

At present, NASA is reviewing the grant recipient responses to systematically identify grant recipient compliance, identify problem areas, and assist in the targeting of recipients for possible onsite compliance reviews.

Again, thank you for the critical insights the report provided. We assure you that we are well on our way to fully implementing our Title IX compliance program.

Cordially,



Frederick D. Gregory  
Deputy Administrator



# Appendix X: Comments from the National Science Foundation

NATIONAL SCIENCE FOUNDATION  
4201 WILSON BOULEVARD  
ARLINGTON, VIRGINIA 22230



OFFICE OF THE  
DIRECTOR

July 2, 2004

Cornelia M. Ashby  
Director, Education, Workforce,  
and Income Security Issues  
U.S. General Accounting Office  
Washington, DC 20548

Dear Ms. Ashby:

Thank you for the opportunity to respond to the draft copy of the report, "Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX (GAO-04-639)."

NSF agrees with the assessment that the participation of women in mathematics, engineering, and science has increased in the last 32 years, but that participation in education in certain fields, and advancement in faculty ranks, is still lagging.

The report recommends that NSF ensure that Title IX compliance reviews of grantees are periodically conducted. We believe that the Department of Education had agreed to conduct these on behalf of NSF.

Nonetheless, our Office of Equal Opportunity Programs is quite willing to participate in an effort led by the Department of Justice to develop new agreements or procedures for coordination of periodical compliance reviews. We would want to develop an independent review program only in the context of coordinated efforts, to make the best use of our resources and to minimize the impact on our grantees.

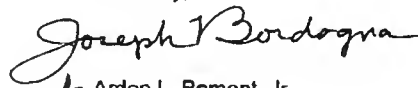
The report notes that Title IX complaints made to NSF involving education institutions are referred to Education, and those involving employment to EEOC. We will continue to rely on investigation services from those agencies for the small number of complaints we receive.

The report observes that some grantee institutions have not established procedures for resolving Title IX sex discrimination complaints and have not adopted or published complaint procedures. Further, they are not tracking the complaints they do handle. Finally, the report notes that there is little awareness generally that Title IX applies to academics and not just sports programs.

NSF Grant Conditions (Grant General Conditions (GC-1), July 2002, Article 27. Nondiscrimination, and the Federal Demonstration Partnership Phase IV Operating Procedures, Appendix B) require compliance with the provisions of Title IX. Nonetheless, we will task our Policy Office in the Division of Grants and Agreements to explore the viability of use of additional mechanisms for communicating the requirements of Title IX compliance to NSF grantees, such as through outreach and other formal policy issuances.

NSF continues to value and invest in broadening the participation of women, minorities, and persons with disabilities in science and engineering. The Science and Engineering Equal Opportunities Act of 1980 (Public Law 96-516) mandated that NSF report statistics on underrepresented groups and initiate programs fostering more proportionate participation. Our funding policies, review policies, and programs continue to implement and embed this important mandate. One of the four long-term strategic goals in our 2003-2008 Strategic Plan is a diverse, competitive, and globally-engaged U.S. workforce of scientists, engineers, technologists, and well-prepared citizens.

Sincerely,

  
for Arden L. Bement, Jr.  
Acting Director

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# Appendix XI: GAO Contacts and Staff Acknowledgments

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## GAO Contacts

Bryon Gordon, Assistant Director (202) 512-9207  
Sonya Harneyer, Analyst-in-Charge (202) 512-7128

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## Staff Acknowledgments

In addition to those named above, Kopp Michelotti, Kelsey Bright, John Mingus, James Rebbe, Richard Burkard and Sue Bernstein made important contributions to this report.

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